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## **ABSTRACT**

A method for producing laterally varying multiple diodes and their device embodiment are presented herein. As demonstrated, multiple resonant tunneling diodes are fabricated together utilizing a single epitaxial structure. Shallow, ion-implanted regions having varying depths,  $d_x$ , define the collector contacts. Each diode is isolated electrically from the others by methods such as conventional mesa etching into the emitter layer. The varying depths,  $d_x$ , provide means for varying the peak voltage of each individual diode. The peak voltage strongly depends on the depths,  $d_x$ , because it comprises a space charge region where the electric field is high, and therefore the voltage drop is high. The invention disclosed herein is useful in applications such as high-speed circuits such as comparators, analog to digital converters, sample and hold circuits, logic devices, and frequency multipliers.